ON

THE CERTAINTY AND SAFETY

WITH WHICH

The Operation

FOR THE

EXTRACTION OF A CATARACT

FROM

THE HUMAN EYE

MAY BE PERFORMED,

AND

ON THE MEANS BY WHICH IT IS TO BE ACCOMPLISHED.

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WITH

REMARKS BY CAPTAIN KATER, F.R.S.

ON

CERTAIN SPOTS DISCOVERABLE

IN

THE HUMAN EYE,

AND ON

THE MANNER OF DETECTING THEIR SITUATION.

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TO

SIR J. E. SWINBURNE, BART., F.R.S.

CHAIRMAN OF THE COMMITTEE OF MANAGEMENT OF THE ROYAL WESTMINSTER OPHTHALMIC HOSPITAL,

THIS,

THE FIRST SPECIAL REPORT ON PARTICULAR DISEASES AND OPERATIONS,

IS INSCRIBED,

AS A MARK OF RESPECT AND ADMIRATION FOR HIS GREAT LIBERALITY, HIS UNWEARIED ATTENTION, AND CONSTANT KINDNESS, IN CONDUCTING THE AFFAIRS OF THE CHARITY,

BY HIS VERY FAITHFUL AND OBLIGED SERVANT,

G. J. GUTHRIE.

24th May, 1834.



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ON THE

OPERATION FOR THE EXTRACTION

OF

A CATARACT FROM THE HUMAN EYE.

An ancient professor of the ars oculistica is stated to have said that a man must spoil a hatful of eyes, before he could learn to extract a cataract well: that is, he must blind as many people. A statement which I do not deny, but on the contrary, believe to be true, provided the directions given at that time, for the performance of the operation, were implicitly followed. These directions, it must be admitted, have been modified in various ways, but still I do not think they are yet so precise, or so clearly stated, as to enable a surgeon to understand thoroughly what he has before him; the difficulties he will probably meet with, and the way in which they are to be obviated. The gentlemen who have given the various directions extant on the subject, perhaps told all they knew; but it is possible they did not, or did not at least tell quite *all;* or they may have deceived

themselves in the manner of telling it. Be this as it may, I have found from experience that some things are yet to be told; and although I may be accused of vanity, in supposing I understand this matter better than my predecessors, I shall willingly submit to the imputation, provided I can console myself with the idea of having been instrumental in saving one person from blindness. I do not doubt that many of my contemporaries know more than I do, and I only beg of them to follow the example I hope now to set; and by telling it as quickly as they can, place the surgery of this operation on the same footing as that of other parts of the body.

The operation of extraction ought only to be performed in cases of hard cataract, which may be easily distinguished from all others. It is, however, possible to make a mistake, and to suppose that a cataract of moderate consistence is soft enough to be cut with a knife, without being extracted (a different operation), when it is really not so; but I believe it is impossible to suppose, that a truly hard cataract is any thing else but what it seems to be, and really is.

On proceeding to the examination of a person afflicted with blindness, it is always advisable to look at the eyes in the first place, in order to ascertain whether an opacity really exists behind the iris, or not; after which, the surgeon may continue his investigation of the appearances, or inquire into the history of the symptoms, or illness which led to it. He should ascertain whether the opacity commenced, and proceeded to its completion, without pain, either in the

eye, or forehead; whether there was any increased sensibility to light; what degree of light, or of the shadows of objects passing before the eye, the patient is capable of perceiving; the manner in which the complaint came on; the diseases to which he is liable, whether he is hereditarily disposed to them, or otherwise; and whether an attack of any of them, especially of gout, rheumatism, erysipelas, or fits, be impending. These questions being answered favourably, seem to imply the existence of a true cataract, which opinion will be confirmed by examining the eye by the touch, in order to ascertain that it possesses its natural firmness, and by seeing that the sclerotic coat, or white of the eye is free from disease, or varicosity of its vessels, that the cornea is pellucid, and that the iris is not only plane, and of its natural colour, but that the pupil possesses its regular motions, when exposed to the influence of light. The state of the lens itself, next demands attention, and it ought to be examined first by a direct front view, whilst the iris is under inspection; and subsequently sideways, in order to discover how far it has interfered with the posterior chamber of the aqueous humour; whether it retains its proper distance from it, or presses forwards, or recedes from the pupil; which investigation may be assisted by moving the head in a corresponding direction. The extract of belladonna, dissolved in water to the consistence of cream, may be rubbed on the forehead, and eyebrow; or a little, more diluted, may be dropped into the eye, under the influence of which, in the course of an hour or two, the pupil becomes fully dilated; or, if otherwise, the application

may be repeated once or twice in the day, for further examination on the subsequent morning. The pupil will now be either fully dilated, or the points of its adherence will be clearly demonstrated, by their remaining fixed whilst the rest of the pupil yields, the salient points being thereby exposed; or the pupil will remain permanently fixed, showing the attachment of the whole internal surface, to the capsule of the lens: or it will remain immoveable, whilst the distance between it and the opacity can be distinctly perceived to be as great, or even greater, than natural; the iris inclining backwards, under which circumstance it will in general be tremulous. These parts, as well as the surface of the lens, should now be examined with a magnifying glass, best suited to the eye of the surgeon.

When the eye is sound, and the lens is perfectly hard, the following essential symptoms will be perceived or ascertained: the cornea is pellucid, the iris plane, and healthy in colour, and the pupil regular in its motions and appearance; the opacity, or lens, is of a grey or amber colour, verging to yellow, or a brown walnut hue, and is said to be sometimes black. When it is of a grey or amber colour, the centre of it seems more dense in appearance, or of a deeper shade of colour, constituting what has been termed cataracta centralis. The opacity is at a distance from the iris; and, on viewing it sideways, this can be distinctly perceived, as well as an appearance of the surface, resembling a fine polish, which it loses if the capsule be opaque. The distance of the opaque lens from the iris, causes a slight narrow shade, of a

darker colour, to be thrown upon it, or on the side next the light, when it falls upon it obliquely, which shade cannot be seen when from the size of the cataract, it touches the iris. In the formation of this disease, the central opacity can often be perceived long before the whole lens has partaken of it; the patient, therefore, sees best in the evening, or when the pupil is dilated, or when an object is placed on one side, a symptom which is common in amaurotic persons, and, therefore, not diagnostic of cataract; but it shows that when the cataract is of that particular kind, the patient is seldom perfectly blind. When the whole of the lens is opaque, the centre is of a deeper colour, brighter or clouded, but white specks are never observed in it, and it has always the same appearance.

When the opacity does not commence in the centre, it usually occupies three different parts, corresponding to the three portions in which the lens may be divided by boiling or charring it, the division between them being semi-transparent, and of a different colour. The lens is small and hard, particularly so in the centre.

When the lens is of a dark or black colour, the disease may be mistaken for amaurosis, but the diagnosis will be found in the lively motions of the iris, the absence of the brilliancy of the black colour of the pupil in its natural state, and by the figure of the person examining the eye not being reflected by it. The history of the case ought to induce suspicion; and if the pupil is dilated, I conceive all doubt must be cleared up, and the disease be distinctly evident.

When the opacity begins far back in the lens, all the symptoms of hard cataract may be present, and

the patient may be nearly blind, yet the anterior part of the lens scarcely partakes of the disease; and when the opacity is seen through it, its surface shows what may be compared to a thicker coat of polish. In such cases the lens is generally found to be very hard, but thinner than natural.

When a hard cataract is of a white colour, it has been compared to a white cornelian; it has not a bluish tint, but always a dense appearance, implying a solid body, and a fine smooth or polished surface; it is not in general of a white colour, neither is it clouded or speckled, marks which are indicative of a soft cataract.

It is necessary to remark, that although a hard cataract preserves its natural size, or is even less, and therefore at a distance from the iris, a soft cataract is not always protuberant.

The operation being decided upon, the question of preparation is one usually considered of importance. It appears to me, that the same preparation only is required that would be considered necessary previously to the performance of any surgical operation of importance, and particularly about the head. If the patient is in good health, and free from any appearance of disease, nothing more is wanting than a couple of gentle doses of physic, and moderate abstinence during the week preceding the operation. If the patient has lived regularly well, and is disposed to be of a full habit, twelve ounces of blood may be taken from the arm the evening before the operation. If the health is impaired from an irregular mode of life, it should be amended. If a fit of the gout is

impending, or is supposed likely to occur, it should be allowed to pass over before the operation is performed; or if the patient has a strong determination of blood to the head, he should be cupped a few days before it is done, in addition to the bleeding recommended on the evening preceding the operation; and the same or greater precautions should be taken when there are indications of a tendency towards paralysis or apoplexy. These are, however, only the ordinary precautions which a well-informed surgeon would take in all other cases. When the operation is to be done on nervous persons, care must be taken on the other hand to prevent any undue depression of strength or spirits.

There is a difference of opinion among surgeons, whether both eyes should be operated upon at once, or not. I am now decidedly for doing both operations at the same time in all favourable cases; formerly I preferred doing first one, and when the patient had quite recovered, the other; and I recommended this proceeding from the common honesty which all surgeons should have, believing it to be for the advantage of the patient; but then I was not so certain of success as I am at present, and consequently wished to save even the smallest chance. I must confess that I did not then go to the performance of an operation with the same confidence that I do now, for I only expect a total failure as a matter of accident; rather as an untoward circumstance that may occur, than as one which is likely to occur; and as such an untoward accident would scarcely be possible, with respect to both eyes,

I recommend that they should both be operated upon at the same time, when one treatment only will be necessary. If an accident should occur, and a very vigorous or prolonged after-treatment be necessary, the patient, whatever may be the result, will not readily submit to a second; and if an elderly person, will not be in a state to submit for a great length of time afterwards; and if that second operation should be unlucky, requiring also a vigorous after-treatment, the loss of health and ultimately that of life, may be the consequence. Elderly persons can generally bear a vigorous treatment *once* well, and recover from it completely; but they cannot often bear and recover from it *twice.* It is, however, a matter of election which the patient should make himself, after considering it well. I should prefer having both done at once in my own case, if I were so afflicted, provided I had due confidence in the operator.

When the sufferer is blind of one eye, and can still see with the other, although he perceives daily the decrease of sight in it, his situation in life sometimes renders it imperative upon him, to have the operation done on the worst eye, so that he may never, if the operation proves successful, be altogether blind, and unable to continue in his employment. This is, however, a matter of necessity not of choice, and it is open to every one to adopt a similar method of proceeding.

The operation of extraction should always be done as a general rule, *upwards;* that is on the upper half of the cornea, and this regulates the position of

the patient and surgeon. The patient should be placed opposite a single clear steady light, without sunshine, and a northern light is the best, although it is not of any consequence what light it is, provided it is unaccompanied by the beams of the sun. He should be seated in an arm-chair, the back of which should be low enough to support the head when gently inclined backwards. A night cap fitted exactly to the head, so that it cannot move, should now be put on ; the fore part should be turned up, if it comes too low down on the forehead, and the middle of a light thin spongy kind of linen bandage, two inches and a half wide, should be pinned or sewed to the centre of it behind, ready for use.

For the operation on the right eye, the surgeon should place himself behind the patient, and he will usually find it necessary to stand on a stool, in order to raise himself to such a height, that he may readily lean over, and have his hands at perfect ease ; and in that position and distance from his own head or chest, which is most convenient to him. The patient's head being a little inclined backwards, and duly, although gently and comfortably supported by the cushion, or back of the chair ; the surgeon leaning over from behind, brings the *two* fore fingers of the left hand over the forehead gently down on the eyelid, and raises it up slowly and tenderly, so as to fix it ultimately against the upper edge of the orbit ; and to be able to retain it there so perfectly with the end of *the* fore finger only, that the patient cannot lower it or close the eyelid by any effort he can make. He

should also be able to do this and to make a little pressure on the eyeball, in order to fix it at the moment the incision is begun. As soon as the index finger is in this position, the second finger leaves the upper, and lowers the under lid, and fixes it against the edge of the orbit below. The eye is thus completely exposed, and may be almost fixed between the two fingers. To do all this well, requires a certain degree of practice, but which is very easily acquired. It must be done very gently, very tenderly, and without giving pain, or almost uneasiness. The error usually committed, is in using too much force with the extremity of the finger, which gives pain, and makes the patient swerve; and it is an error of such great importance, that the surgeon must practise this part of the operation until he feels that he does it as a matter of art, not of force.

The left eye may be opened, and fixed in a similar manner; or the surgeon standing before the patient, raises the upper lid with the side of the fore-finger of the left hand, and depresses the under lid with the thumb, the hand being over the nose. The pressure of the fore-finger tends to fix the eye at the same time, and to render it as immoveable as possible, and this mode of proceeding I generally adopt in preference, for the left eye.

The eye being thus opened, and the eyelids retained asunder, the eye loses all the extreme sensibility with which it is endowed for its security, and preservation in its ordinary state. Public opinion, which on medical subjects is generally erroneous, although for the most part founded on pro-

fessional authority, is in no instance more injurious than in relation to the eye. It pronounces it to be an organ of a very delicate nature, exquisitely sensible, requiring the greatest delicacy of touch, and the utmost nicety of management; which opinion some oculists formerly found it convenient to support, and which the public may still continue to believe without any great disadvantage; but students in surgery must be taught otherwise. They must learn, that the eye is not a delicate organ; that it will suffer more comparative violence, with less injury, than any other of importance in the whole body; that, so far from being exquisitely sensible, it is, when exposed in a healthy state, nearly the reverse, only becoming permanently so on the occurrence of inflammation; and that the ablest and most successful operators are not apparently, although they are in reality, the most tender in their proceedings. The opinion of the exquisite sensibility of the eye has arisen from the pain which is felt on the admission of a small piece of dirt, or a fly, between the eyelids; but this occurs from a wise and preservative provision of nature, on account of the insensibility of the eyeball itself. Let the eyelid be raised, and the same piece of dust applied to the surface of the eye, no pain, and scarcely a sensation, will be produced: remove the piece of dirt, turn out the lid, and whilst it is retained everted, place the piece of dirt upon it, no greater sensation will be induced than is felt when it is applied to the eyeball. The inference is, that both surfaces, when touched separately, are nearly insensible to this species of irritation. But let the same piece of dirt be put between

the eyelid and the eyeball, and the sensation produced is exquisitely painful. To give rise to this sensation it is necessary that the two surfaces should come in contact, and that the foreign body be grasped between them. If this were not the case, an irreparable injury would often occur to the transparent part of the eye before it would be observed; and if the raising of the lid and the separation of the surfaces did not nearly annul sensation, an operation could not be performed for cataract; for who could bear quietly the sensation which must arise from pushing a needle into the eye, if it were analogous to that arising from a fly or a dry solid substance between the eye and the lids? The experiment may be tried in a very simple and conclusive manner by any one on himself, by merely keeping the lids apart by an effort of the will, when the end of the finger may be placed boldly on the eyeball without any inconvenience. Inflammation, by enlarging the vessels, gives rise to pain in the same way, and the sensation is at first as if some extraneous matter were interposed between the lids. I was the first to mention this fact, and to explain why it was so, although, I dare say, every body knew it just as well as I did; the only difference between us all being, that I was not afraid to tell the truth. I did it in the following passage, in the year 1823, in the Introduction to the first edition of my Work on the Operative Surgery of the Eye.

" In regard to the difficulty supposed to attend the
" performance of operations on the eye, it partakes
" of the same error, and has been supported for the
" same reasons. The sensibility presumed to exist

" in the organ, naturally led to the conclusion, that " the operations required to be performed upon it " must be difficult of accomplishment; and the " science of optics, in showing the beautiful arrange- " ment of its structure, and the complexity of its " functions, induced a belief that the slightest altera- " tion in its composition must be fatal to its " mechanism: but this is not found to be the case. " Few persons can, however, duly estimate the " liberties that may be taken with the eye, until " they have seen several operations performed; when " the false ideas they have imbibed will be com- " pletely removed, and new feelings will arise, in " admiration of the benignity of the Creator, who, " in rendering the eyeball nearly insensible, enables " it, in its quiescent state, to undergo those opera- " tions which are frequently necessary for the " recovery of sight."

If the extreme sensibility of the eye was not removed by the separation of the lids, it would be impossible to perform an operation upon it, no person could submit to it, however firm and courageous he might be; and those who were once afflicted with cataract must have remained blind for life. The sensibility of the eye after the separation of the lids, is so comparatively dull, that nothing beyond uneasiness is experienced on touching the surface of it; many persons are, nevertheless, extremely agitated when this is done for the first time, the eye rolls in every direction, and is drawn forcibly backwards into the orbit with a considerable effort. If the patient be kindly spoken to, and soothed into a little quietude, the eye

is seen to advance again, the muscles which have retracted it are relaxed; and it may now, by gentle pressure be fixed, although oftentimes not so steadily as to prevent its turning inwards at the instant the operation is commenced. Where persons are naturally irritable or nervous, I always separate the lids, and fix the eye two or three times at an interval of two or three days; and touch the eye with a probe, which removes their fears, and renders them more quiet, and capable of undergoing the operation with less alarm and distrust.

The object gained by the operator's fixing the eye, and in fact doing the whole operation himself without assistance, is unity of purpose; an advantage which every one soon learns to appreciate, and there are none so awkward that they cannot in a short time acquire it; and if they cannot, they should not do these operations. I do not mean to say that an able assistant does not answer the purpose nearly as well; but an able assistant is not always to be had, and it is more difficult to teach an assistant than to learn the art one-self, and it can always be acquired in the performance of the numerous minor operations on this part. The other eye may be advantageously left uncovered: it will follow the motions of the one to be operated upon. The knife I prefer is spear pointed, and blunt on the back: the width depends on the maker, my rule being that it shall be as broad as the perfection of the point will admit, and the artist finds that he cannot put the best point on a broad instrument, so that it is essentially rather a narrow knife. It should be of that degree of equal

thickness which will admit of its passing through the cornea with the greatest facility, and of its bearing the very best possible point and edge. Every thing in this operation depends on the point of the knife, for the operation must fail either partially or totally if the point of the knife is not a good one; nothing else signifies so materially, and it must be attended to. The surgeon should never depend on the instrument maker: he should try it on the fine piece of thin leather which ought to have a place in every case of eye instruments. Through this it should pass as through water, without the slightest sound; for if the slightest sound be heard, the knife is unfit for use. Held between the fore-finger and thumb, with the little finger resting outside the orbit, the surgeon awaits calmly the steadying of the eye, which should be fixed nearly in the centre, the pupil looking directly forwards. The flat part of the cornea knife may now be made to touch the face of the cornea as the probe did before, in order to ascertain that the patient is totally free from alarm, and that the eye is steady.

There is a point in dispute which must have been previously attended to. It is whether the pupil shall or shall not be dilated by the application of the belladonna. The point has been contested; but the advocates for its use, are in the right, although the other party is the more numerous. It is one of the secrets which I wish to make known to young surgeons, and if they wish to relieve themselves from some degree of embarrassment from the iris, they will dilate the pupil fully, before they operate by extraction. We will therefore consider that it has been done

the evening before the operation, either by applying it to the brow, or by instilling it into the eye.

The pupil being fully dilated (and it is of no trifling importance to know that it ought to be dilated), the eyelids being separated, the eye fixed, and the knife ready, the surgeon commences the incision of the cornea, by introducing it near its edge, or junction with the sclerotica. Some say one quarter of a line, some say half a line, others a line, the intention of all is the same, *viz.*, that it may be near to the edge of the cornea, in order to admit of the opening in it being as large as possible; it ought not nevertheless to touch the sclerotica, as parts of the same kind unite more readily than those which are of a dissimilar nature; and it should also be so much above the plane of the iris, that it will pass readily across without touching it. The upper half of the cornea must be completely divided, and if any thing rather more than less, so that the point of the knife must be entered at nearly the least possible distance below the horizontal, or as it is sometimes pedantically called, the equatorial line of the eye.

The manner of entering the point of the knife is disputed. The cornea being composed of several layers, constituting a substance of a certain thickness, there is some danger of passing the knife between the layers, and not across the anterior chamber of the eye in front of the iris, if care be not taken that the cornea is fairly penetrated in the very first entering of the knife; which accident may happen, if the anterior chamber is small, and the iris is close to the cornea. In order to avoid this error,

modern authors (I believe, without an exception), recommend that the knife should be entered in the direction of the iris, as if the point were to be carried directly against it, but that as soon as the cornea is penetrated, and the point is in the anterior chamber, the handle of the knife is to undergo a sort of almost imperceptible depression towards the temple, by means of which, the blade is to be placed with its flat surfaces parallel to the iris, across the anterior chamber; and it is said that the more quickly this is done, the less chance is there of the escape of the aqueous humour. To all this I object in the most decided manner; the gentlemen who think they do as they say, are, I believe, mistaken; and when they do, they do nothing but mischief. The very turning, or attempting to turn the knife, generally leads to the escape of the aqueous humour, the very thing they want to preserve, and to all the evils it is most desirable to avoid. The knife should, in my opinion, be held flat, and the point is to be introduced steadily in the same direction at the proper place; and if the operator can neither see, nor feel when it has penetrated the cornea, and is in the anterior chamber, the sooner he abandons operating the better. If a man has eyes, he can see when the point of the knife has entered the anterior chamber; and if he has fingers, he will feel when the resistance offered by the cornea is overcome. The young surgeon, instead of practising these manœuvres, which are worse than useless, should practise on sheeps' eyes, until he has

acquired that tact, which will enable him to know when his knife is in the right place.

If this first step of the operation is well done, the operator may reasonably hope to be able to carry the knife fairly across the anterior chamber; but he will not always succeed, however well shaped the eye may be. At the very moment that he has penetrated the cornea, and is about to carry the knife on, and the motion should be a continuous one, the patient will often move the eye inwards: it is an involuntary motion, which the person cannot help, and as it is of common occurrence, the surgeon must be prepared, and do his best to prevent it. This can only be done by waiting, in the first instance, until the spasmodic action of the muscles of the eye has ceased; and then just before he enters the knife, by fixing the eye as much as possible with the two fore-fingers, if operating on the right eye. The upper one presses gently on the upper part of the globe, the lower one, whilst it depresses the lower lid, also applies itself to the inner and under part of the eye, by which, an effort is made to counteract the turn inwards, if such an occurrence should take place.

If the turn takes place just after the point of the knife begins to advance across the anterior chamber, none but a calm, deliberate, and experienced operator will be able to finish the operation successfully. If he hesitates, the aqueous humour will escape, the point of the knife must be entangled in the iris, which immediately falls forward against the cornea, and the surgeon has nothing to do but to withdraw his knife,

let the wound heal, and try again, a fortnight or three weeks afterwards. If, on the contrary, the turn inwards of the eye only takes place as the point approaches the opposite side of the cornea, the case is different, and a steady operator will readily complete this part of the operation by carrying the knife onwards, even if the point should be out of sight; and if he can carry the point through the cornea, which is called completing the punctuation, he is safe. If the accident should not occur, and the eye remains steady, the knife will in all probability go safely across the anterior chamber; but if the hand of the surgeon wavers for an instant, or the patient endeavours, however unwillingly, to retract the eye, on feeling that it is wounded, the pressure caused by this effort of the muscles, forces out the aqueous humour, and the point of the knife in either case may be even enveloped by the iris. If all these evils should be avoided, and the knife has swiftly as well as steadily crossed the anterior chamber, it may not be able to penetrate the cornea on the opposite side. This entirely depends on the perfection of the point of the knife, and therefore on it the success of the operation rests. The inner layer of the cornea, or membrane of the aqueous humour, as it is improperly called, is much more dense and firm than the outer one, and the knife, which will easily enter, will not always be able to come out on the opposite side. I have, in some cases, been obliged to use such a degree of force, (and have even then not succeeded) that I have almost felt assured that the knife, when it did perforate the part, would inevitably go on, and stick into the nose.

This greater degree of denseness of the cornea must always be reckoned upon, and in every case a proportionate degree of power must be applied, as the point of the knife touches the inside of the cornea, that it may go through without any delay, at which moment the aqueous humour frequently escapes in part or in totality. In order to prevent this, and the evil consequences which may ensue, there must be no hesitation in this part of the operation. From the moment the knife enters on the one side, it should be carried swiftly but not hastily on, with a steady undeviating progressive motion of the thumb and fore-finger, or two fore-fingers, until it passes through the opposite side, and the centre of the blade is in the middle of the anterior chamber, exactly opposite the pupil. This is the acme of perfection in operating, and must succeed; there is scarcely anything can prevent such a case from turning out well. I am aware that it cannot always be done, and that it suffices to have the knife fairly through on the opposite side, but then the after steps are not so certain. If the width of the knife be compared with the width of the upper half of the cornea, it will be seen that they are nearly equal; and as the flat sides of the knife lie one against the cornea, the other against the iris, the latter part is kept back, and can scarcely get before the edge of the broad part of the knife, indeed it cannot do so, and the knife is either carried on with the same motion so as to cut its way out, or if the angle of the eye-lids or the nose, or any accidental motion of the eye upwards prevent it, the knife must be made to cut its way out,

not by one forcible effort, but by gently acting with the blade first towards the point, and then with the heel, so that the inner portion of the upper part is divided by the blade near the point, the outer by the heel; for the cornea is often very tough, and requires this sort of zig-zag or sawing motion to be made before it will yield. The section of the cornea, thus completed, should be one perfect half, and a little more, rather than any thing less, and the incision should be at an equal distance from the sclerotica, or from the edge of the cornea, all round: but this is not often accomplished, and is of little consequence, as the cicatrix is out of sight.

The difficulty in doing this part of the operation arises from the escape of the aqueous humour; for as this fluid lies before and behind the iris, the two portions communicating through the pupil, the sudden escape of even one-half of it, causes the thin membranous iris to fall forward flat against the cornea, and of course against the knife, the slightest withdrawal of which, allows of the escape of the remainder, when the whole of the contents of the eye are pressed forward by the action of the recti muscles against the cornea. It is at once obvious, that no sharp-pointed instrument can now cross this space. If the escape of the aqueous humour does not take place until after the knife has crossed the anterior chamber, but has not penetrated the cornea, the operator must not hesitate, the knife must go on, and complete its object; for the iris will not be cut by that continued

progressive motion of the knife, which will enable it to perforate the cornea.

When the perforation or penetration is completed, and well done, the patient and surgeon are in a very different relative situation to each other; before it was done, the eye was almost entirely under the controul of the patient; after it is done, the eye is almost entirely under the controul of the surgeon. It moves with, and of course follows the motions of the knife, and if it has turned inwards, even into the very internal angle, the knife can bring it gently back to its due central position, but not without the loss of the whole of the aqueous humour; and the iris is now seen bulging forwards on the edge of the knife, sometimes even overlapping it. It is at this point that a young operator is confounded, he sees that the iris must be cut, if it cannot be moved out of the way; he thinks he has failed, becomes confused, hesitates, and does mischief, or withdraws the knife and abandons his operation: or if he is a clearer-headed person, he bethinks him of the directions he has read upon this subject, and proceeds accordingly; but he does not succeed one whit the better, and in despair, accuses himself of awkwardness. But he is not, however the person in error, it is those who wrote the directions. I do not mean to say that these gentlemen have willingly deceived the public, but I do say it is my opinion, that they have told only half the truth. It may be that they did not know the other half, and I have no objection to its being so considered,

except that I shall be set down for a discoverer of it, whether I will or not, which I am very desirous to avoid. The directions given in such a case by the Baron de Wenzel, and which the late Mr. Ware said, were the most important in his whole book are, that the cornea must be gently rubbed with the point of the fore finger, which causes a contraction of the pupil and consequent drawing back of the iris, when the surgeon must complete the operation; but if the iris again fall forward, before this is acomplished, he must keep the finger on the cornea, until it is effected, by which, all danger of the iris suddenly protruding will be avoided. It is also recommended that the surgeon should wait a little, and allow the spasm to subside; and he may wait and rub, and wait again, and then rub again if he pleases, but he will rarely succeed, unless he does something more, and that is, to raise the eye, or in other words, to draw it as it were out from the orbit, whilst at the same time he presses the cornea flat against the blade of the knife. This is the other and the best half of the secret, and without he does which, he will not succeed in disentangling the iris. A little consideration will, I think, show why it can only be done in this manner. When the aqueous humour has escaped, the cornea becomes flaccid, and the remaining humours of the eye advance, or are brought forward by the action of the recti muscles, so as to press the iris against it. If the knife is between the iris and the cornea, it keeps these parts asunder, as far as its width extends, but not farther, and as it raises the cornea in every part, it would make a vacuum below its edge, between the

iris and the cornea, if the iris did not rise up to fill the space, or if the air did not rush in to do it. This effect of the air, is however counteracted by the muscles acting on the eye with greater power; and the consequence is, that the iris is forced upwards into the vacant space, and the air, if any has entered, is expelled. The iris can, however, be only elevated or protruded to a certain extent, in consequence of its circular attachment, and of its disposition to contract towards its pupillary edge, or centre. When the cornea is well raised, so as in some degree to raise the eye along with it, whilst, at the same time, the cornea is pressed against the blade, the iris slides from between them, and the operation may be completed, so as to give rise to a highly-successful operation. There is now another secret to be disclosed, of yet greater importance to the young operator, it is, that the effect of an injury to the iris is very greatly overrated, and that if the operation cannot be completed without injuring it, the injury must be committed. The real truth is, that *no good operators* in this great city of London do otherwise. When the iris bulges much over the edge of the knife, it is often not possible to get it quite clear, by any effort, exertion, or dexterity, on the part of the operator. If any man says otherwise, I do not hesitate to say that he is in error, and that his own operations, if he has ever done any, will show it. This being the case, the operator has only a choice of evils, to proceed under any circumstances, or to abandon the operation. This I have done, and

the consequence was, that as much inflammation followed as if the operation had been duly performed; and the eye was not upon the whole in a very favourable state for a future operation, the iris being usually a little injured, and the consequent inflammation rendering the pupil less regular and dilatable, than it ought to be. If the operation is on the contrary completed, the iris is slightly shaved as the knife advances, or a piece may even be cut out, but the patient will, nevertheless, have a very good eye. The cut in the iris will often not be discernible, unless the upper lid is raised to look for it, and he will see remarkably well, after a very speedy recovery. In fine, I may say the operation is always done in this manner by all those who know what they are about, and the eyes of persons of all ranks who have been operated upon, either in London or on the Continent, prove it. It is possible that the operators may not know what they have done, or how they did it; they may have supposed they were doing one thing, whilst they were actually doing another. I do not dispute this, or anything else, in the least, but I write to give such information to young surgeons as will enable them to operate successfully, and to know why and wherefore it is that they are successful.

The woman they say who hesitates is lost; of this I have no knowledge, but that the surgeon who hesitates in the first steps of this operation, is very likely to lose his patient's eye, I am certain. There should not be one, not even the slightest stop, from the moment of entering the knife, until the cornea is wholly divided, or at least until the incision is nearly completed;

for in very nervous or agitated persons, I always leave the smallest possible portion of the upper part of the cornea uncut, and withdraw the knife, which prevents the sudden expulsion of the contents of the eye, and the slight division of which afterwards is of no consequence. It may be done with a narrow, curved, blunt pointed knife, or with the double guarded cataract knife. The most difficult thing to acquire in surgery, is this happy tact which enables a surgeon to begin and complete his operation without hesitation, and nothing but experience can give it; but this experience becomes less onerous to all parties when it is confined to one point alone.

Jager of Vienna, and Graefe of Berlin, aware of the difficulties attendant on the division of the cornea, have each invented a knife for the purpose of aiding in the removal of them. Jager's is a double knife, one blade lying on the other, so that when it has passed through both sides of the cornea, the upper blade may be made to cut its way out. It did not appear to me, on the trials I made, to answer the purpose; but from the contemplation of it, I was induced to suggest to Messrs. Everill and Mason, of St. James's Street, one with two blades, the under of which should be blunt in every part, the upper, the usual cutting knife. This kind of double knife can only be used after the cornea is opened, when it may be carried across the anterior chamber in any direction; the blunt blade raises the cornea, and presses back the iris, when the cutting blade, which is a sliding one, is to be advanced or pushed forwards, so that it may penetrate the cornea, and complete the

punctuation, if that has not been previously accomplished; it afterwards cuts its way out, the blunt blade protecting the iris. The knife with which the cornea is opened, should be rather larger than the double one, so that the latter may enter easily, and in this way the operation may be safely completed, after the surgeon has failed in effecting the punctuation, in consequence of the escape of the aqueous humour; provided he has managed in withdrawing the knife, to make the opening in the cornea large enough to admit the double-bladed one. I have often done the operation purposely in this manner, *viz.* by dividing one fourth of the cornea with the single knife, which can always be done without injuring the iris, and then by dividing the remainder with the double-bladed knife. I did this before I was as well aware as I am now of the best way in which all the difficulties I have alluded to are to be surmounted; but after due consideration of them all, I prefer dividing the cornea by one incision, or by leaving only the smallest possible piece uncut at the upper part, and having recourse only to the double knife to enlarge the incision, when it appears to be necessary. I have been able to complete many operations successfully by it, which could not have been well done by any other means. No young operator should be without one of these knives for each eye, and older ones will often reap great advantage from their use.

When the Chevalier de Graefe was in England, I invited him to the hospital, and requested him to perform an operation by extraction, in order to show

me his mode of using a knife of his own invention, the extreme end of which is a little curved, so that when it has passed, across the eye and through the cornea, it has, by its curvature, a greater power of drawing the eye outwards or downwards, if it should have turned inwards or upwards, by that involuntary action of the muscles which the patient cannot often command, nor the surgeon controul. It did this in the case on which he operated, and the aqueous humour escaped; I was, however, quite delighted to see that he then proceeded with his operation precisely in the way I have recommended it to be done. I was satisfied that he knew as much as I did about it, and I was infinitely more gratified to perceive that he did not know more; that I had discovered already all that he knew perhaps long before me, but still that which is not before the public, and I beg thus publicly to acknowledge the satisfaction and gratification I derived from his visit. I had a knife made like his, and tried it on the first similar case that presented itself; but whether German steel is less brittle than English, which I believe to be the case, or whether I was awkward, which is very probable, the point of the knife broke in the eye on the attempt to penetrate the further side of the cornea, or to complete the punctuation. I was of course obliged to withdraw it, leaving the point sticking in the inside of the cornea, and to complete the division of this part with my double knife, by which it was easily and safely done. The point of the knife was now extracted; but it fell against and stuck into the iris. From this situation it required some address to

remove it ; the operation was, however, at last happily completed, and the man recovered his sight. The operations were both done on the left eye, and the cornea was divided downwards ; they are now so much alike in appearance that they form a good pair, the pupil in each being directed downwards, or to the incision. The man on whom de Graefe operated is George Pridham, 67 years of age, and is in St. Martin's Workhouse ; my patient is Henry Hughes, aged 64, and lives 28, Eagle Street, Red Lion Square.

After each step of the operation, or the introduction and withdrawal of any instrument, the upper eye-lid should be allowed to fall, and the patient to rest for a minute or more, if necessary, this operation being one requiring coolness on all sides. The division of the cornea having been completed to its due extent, the next thing to be done is to divide the capsule of the lens, unless the action of the muscles has forced the lens out, which it will sometimes do, with a portion of the vitreous humour. The division of the capsule is to be effected by introducing what is called a hook under the flap made in the cornea, and between it and the iris, until it reaches the pupil*. The end of the hook, forming a right

* The hooks sold in the shops were totally incompetent to accomplish the purpose intended, and those who used them must have altered them after they came into their possession, or suffered much inconvenience. I have taken some pains to correct this little irregularity, and to have the point of the hook placed at a right angle with the shaft of the instrument, so that when it is turned to the capsule,

angle with the shaft, is to be introduced on its side, the point being backwards, so that it cannot catch or tear any thing until it has arrived opposite the centre of the pupil; then the point is to be turned towards it, and several slight scratches are to be made in the capsule in a circular, or in different directions; when the hook is to be turned on its flat side, with the point reversed or downwards, in which state it can be easily withdrawn without entangling the iris. During this part of the operation, a bright light should not be allowed to fall on the eye, as the pupil will contract, and offer some little impediment to its performance. The lid need not be allowed to fall after the removal of the hook, unless the patient shows symptoms of restlessness, when it should be done; if he is quite quiet, the natural but not increased pressure of the muscles will cause the opaque lens or cataract to advance, and will ultimately expel it, without any assistance, provided the capsule has been sufficiently divided, so as to offer no resistance, and the incision in the cornea is large enough to allow a free passage through it. The other end of the handle, to which the hook is affixed, should have attached to it what is called a curette, an instrument very like a small marrow spoon, with which the lens may be assisted if it appears to be impeded in its progress, or the hook itself may be stuck into it; or if any portion of it or of the capsule should be soft, and has separated from it, or if any blood should be effused from a wound

it may penetrate it without difficulty. This trifle constitutes, nevertheless, one of the greatest improvements in the instruments sold for the operation of extraction hitherto made.

in the iris, it may be brought away by it, and this must be done with great care and gentleness, the falling of the lid being regulated by circumstances.

When the lens will not advance under ordinary circumstances after the capsule has been duly opened, there are two points to be attended to, as offering impediments to its progress. One is a deficiency in the extent of the incision in the cornea, the other an insufficient rupture of the capsule. If the lens should be large, it cannot come through a small opening, and it will not rise up from its situation to come through one which is large enough to allow it to pass, if drawn through with a hook. In order to allow it to rise from its proper place, under the action of the muscles of the eye, one half of the cornea must be divided, and very little more than half will render the progress of it more easy. It is said that the exact portion of the cornea to be cut, should be nine-sixteenths of the whole circumference. If something less than half be cut, the undivided part acts upon the surface of the lens like a band drawn across it, and keeps it so steadily fixed in its place, that it will resist a considerable degree of pressure made with the point of the fore-finger, on the under part of the eye. This pressure, although occasionally necessary, should always if possible be avoided; inasmuch as it is often injurious, by causing a sudden instead of a gradual expulsion of the lens, and with it, in all probability, a discharge of the vitreous humour. Inflammation always follows the discharge of a lens which is accomplished by force.

When the lens does not begin to move from its situation, after the capsule has been torn, the surgeon must satisfy himself that the incision in the cornea is sufficiently large; or if it is not, he must enlarge it. He should be equally certain that the capsule is sufficiently torn through, by repeating that part of the operation; when, if there be nothing to impede the advance of the lens, it will be seen to rise from its situation, its upper edge gradually passing through the pupil and sliding over the iris, unless the external incision is not sufficiently large, when it may protrude the iris before it, at which moment it should be assisted by the hook, or curette, and on its expulsion, the lid should be allowed to fall. If the flap made in the cornea should by accident be turned downwards, it must be replaced in its situation by the end of the curette, when the lid is again raised.

The lens does not however always come out so easily and regularly. It sometimes happens that instead of rising up by its upper edge, the vitreous humour, which appears black because it is transparent, and allows the black pigment beneath to be seen through, is perceived pushing forwards between it and the iris. Nothing can prevent a portion of this vitreous humour being protruded, or expelled, and no attention need be paid in order to obviate it, for it cannot be done. But attention must be paid to the fact, that its expulsion under pressure will not in general be accompanied by that of the lens, which, having lost its support, will sink down towards the bottom of the eye, and must infallibly cause its destruc-

tion by inflammation, if not removed. The surgeon aware of this circumstance, and knowing that pressure of any kind, that even the mere action of the muscles, will cause the expulsion of the vitreous humour without the lens, passes either the large or the small hook under the edge of the lens, through the vitreous humour; which begins to escape when its enclosing membrane is pierced by the hook, the point of which is to be fairly stuck into the under part of the lens, and thus drawn out. A portion of vitreous humour must of course escape, it cannot be prevented, it was inevitable from the first; but the great object, the extraction of the lens, has been attained. If the surgeon hesitates, and does not calmly and steadily introduce his instrument, and hook the lens at once, the vitreous humour begins to escape, the lens sinks, and the eye will be lost, if he does not instantly pass the hook through the pupil, and hook the lens, as he would catch a fish with a landing hook. There is no alternative, it must be done, or the eye will be destroyed.

It sometimes happens that the lens is suddenly expelled, on the incision being completed, by a spasmodic action of the muscles of the eye, and with it a great portion of the vitreous humour. I once saw the lens violently forced out, and the vitreous humour with it, and it appeared to me, as well as to the operator, that the whole of it was discharged, nevertheless the patient recovered a fair degree of sight. This case taught me how much might be lost, without the eye being destroyed, and I soon learned that a great part might be lost, without any inconve-

nience ensuing. I apprehend that it is better to lose a fourth or a fifth part, than an eighth, although it is still better to lose none.

The loss of a portion of the vitreous humour has been a surgical bugbear in doing this operation. It is always better that it should not take place, but it is not of such material consequence if it does; the principal inconvenience accruing from it being an irregularity of the pupil, which does not in many instances impair vision. It is however an evil, but it is also one which happens very frequently in the hands of the best operators, and cannot be avoided; for it sometimes occurs from a change of structure, which has taken place in it, and in the attachment of the capsule of the lens to the membrane which surrounds it; a change which may be in some cases ascertained, but which in others cannot be known.

The vitreous humour, being a more consistent substance than the aqueous humour, forces the pupil upwards, in the direction of its passage out of the eye; from whence it is not easily induced to return to its proper situation, whilst a portion of the vitreous humour is apt to remain between the edges of the cut part of the cornea, and prevent their early and complete union. If a very small portion of vitreous humour only be lost, it is usually followed by severe inflammation; if a larger quantity be lost, there is usually less. The derangement which is caused in the mechanism of the part, and which must be followed by inflammation, being compensated by the loss of matter, allowing the vessels of the enveloping

membranes to enlarge with greater facility; whilst the secretion which takes place to fill up the eye, and which is accomplished in a few hours, in all probability tends to diminish the inflammation.

The irregularity of the pupil, which occurs from the sudden expulsion of the vitreous humour, and from its resting on or adhering to the iris, is neither easily nor generally overcome; the pupil is drawn in the direction in which the expulsion or evacuation has taken place, and usually remains more or less in that situation. The best method of causing its return to its natural place, is to allow the lid to fall, and then to rub it very gently with a soft and wet sponge, for two or three minutes, which often brings it very nearly back to its central position. I have seen cases in which little or scarcely any deviation from the proper situation of the pupil has taken place after an evacuation of the vitreous humour; but it is more usual for it to remain drawn upwards or downwards, as the incision may have been made, constituting principally a defect in the appearance of the eye, which persons on recovering their sight do not usually much regard, or lament. A greater inconvenience arising from the evacuation of the vitreous humour, is, that a portion interposes between the cut edges of the cornea when they are supposed to be placed in apposition; and whilst it prevents a rapid union between these parts, it also tends, by allowing the newly secreted aqueous humour to escape, to draw the iris into the line of the incision. If this takes place, the iris adheres to the cut surface, the pupil is permanently

and more completely drawn in that direction, and the anterior chamber of the aqueous humour is less perfect, both in shape and appearance, in consequence of the cornea and the iris being brought nearer to each other. This inconvenience, arising from the interposition of the vitreous humour between the edges of the incision in the cornea, is to be avoided, as far as it can be done, by carefully removing with the curette any part of it which can be seen, and by gently rubbing the eye in the way I have directed, in order to cause the pupil to return to its proper place.

The last point of importance in the operation, is to place the cut edges of the cornea in apposition, and this is to be done most carefully. In many cases it is best effected by a gentle friction on the lid; in others, the cornea will require to be replaced *in situ* by the end of the curette; but in all, it must be done so that there is little appearance of separation between them; and the operator should satisfy himself of the fact, before he desires the patient to look upwards, and closes the eye for the last time.

When the operation has been successfully done, the cornea must of course lie flat on the iris, or nearly so; and particularly that part of it which has been cut, the eye being more hollow under the cornea, in consequence of the absence of the lens, and the loss of the aqueous humour. In this state, adhesion between the cut edges very rapidly takes place, the newly-secreted aqueous humour is retained, and in thirty-six or forty hours, and often earlier, the plumpness of the eye is restored; although the adhesions are so delicate as scarcely to bear the

slightest pressure from the action of the muscles of the eye, until at least as many more hours have elapsed. If, on the contrary, the eye does not appear flat, when the flap of the cornea is adjusted, the improper fulness arises from some displacement of the vitreous humour, which has not burst the membrane in which it is enclosed, but has been pushed forwards by the action of the muscles of the eye, so as to cause the iris to project; the flap of the cornea is seen lying upon it, and is separated by it from the other edge, with which it ought to be in apposition. If the parts remain in this state, no union can take place, the iris will inflame, and be drawn into the line of incison, and the pupil will be ultimately turned upwards, contracted, and sometimes obliterated. The edges of the cornea must ulcerate, and can only unite by granulation, and the cicatrix will be broad and white. The uneasiness, pain, and suffering, will be considerable; the after-treatment will be prolonged and severe; and the patient will recover with a defective state of the eye, both as to appearance and vision. In order to prevent these evils, the vitreous humour must be pressed back into its place by gentle friction on the eyelid covering the ball, by which it may in general be accomplished; but if it will not yield to this treatment, the hook should be introduced through the pupil, and the membrane of the vitreous humour should be punctured, so as to allow of the evacuation of one fifth of it, when the eye flattens, and the cut edges of the cornea can be brought into apposition. The extent of evil is now known, and can be duly estimated, and guarded against. In the

former case it cannot; and of the two evils, the last should always be chosen, inasmuch as it will lead to the recovery of the patient with a good eye, which the other cannot do.

The eyelid, being at last closed, is to be retained in that situation by compress and bandage; and it is not to be raised, or the eye opened, for a certain length of time, the duration of which is different, according to different writers. It ought to depend on circumstances; the earliest period is on the third day, but the fourth is much better; and if any difficulties have been experienced during the operation, and there is reason to suspect that union has not taken place, the lid should not be raised for at least a week; although the lower lid may be depressed, to enable the surgeon to see the state of the ball of the eye, and to prevent the accumulation of fluids in it. I never open the eye before the fourth day, although I frequently depress and clear the lower lid on the third, and obtain a view of the globe, the whiteness of which is the best sign of the absence of inflammation. When the eyelid is raised too soon, that is before the union of the cut parts of the cornea is complete, the movement of the globe of the eye, which inevitably follows the raising of the lid, often separates the incompletely united parts; pain of a more or less acute nature is soon felt in the line of the incision, inflammation follows, ulceration succeeds, and the cornea is only completely united by a slow process, attended by opacity, and generally by a drawing up of the pupil; all of which evils would have been avoided in a great measure by delaying the raising

of the lid for two or three days, until the parts were more completely consolidated.

The state of the eye, during this period, with regard to the presence or absence of inflammation, is known by the appearance of the upper lid, without direct reference to the eye itself. The state of the eyelid should, therefore, be carefully ascertained twice a day, morning and evening; and this is a point of so much importance, that it should never be overlooked. When there is no inflammation, or no more than is necessary for the due adhesion of the divided parts, the eyelid is scarcely altered from its natural appearance. When some derangement has taken place, and an undue degree of inflammation has been established, the eyelid swells, and the swelling may be safely considered to be in proportion to the inflammation, and the treatment may be advantageously conducted accordingly.

When the operation has been completed, and the eyelid has been finally closed, a thin compress of coarse but soft and spongy linen should be placed over each eye, and the night cap should be fitted close to the head; the bandage being pinned behind, and under each ear, admits of its being brought diagonally over the eye of the same side, and of its being pinned on the opposite side of the head. The two ends of the bandage thus cross over the root of the nose, and confine the eyes each on their own side, with a degree of pressure which should be comfortable to the patient, but not giving the slightest uneasiness. The room should be darkened, and on the subsequent morning the eyelid should be carefully freed (in the

most gentle manner) from any moisture, and the light compress and bandage replaced. The occurrence of a discharge of tears, and particularly hot ones, marks some degree of inflammation, which must be immediately arrested, and more particularly if the eyelid swells. This is only to be done by the abstraction of blood, in the first instance from the arm, and locally afterwards by cupping or leeches, as the case may require, or the swelling of the lid may seem to render necessary. In fact, the treatment must be strictly antiphlogistic in every point; and in order to prevent the occurrence of mischief, or of inflammation, I usually direct the abstraction of from twelve to sixteen ounces of blood, the last thing on the night of the operation, and more particularly if there is any uneasiness in the eye. It is not absolutely necessary to abstract blood in weakly persons; but it is never injurious, and saves perhaps a greater evacuation afterwards. It should never be carried so far, if it is possible to avoid it, as to cause sickness, for the effect of vomiting might be to derange the apposition of the edges of the incision. The eye may be occasionally fomented with a warm decoction of poppies, care being taken that the eyeball is not moved, so as to cause a separation of the divided parts; all remedies likely to cause sickness should be avoided during the course of the treatment, and active aperients for the first two or three days, will, in all probability, be unnecessary, from their having been adopted previously to the performance of the operation. Two of these precepts in the after-treatment, I con-

sider to be of great importance. I acquired a knowledge of them by the attentive observation of a great number of cases, and they will not deceive. I never commit an error when I attend strictly to the state of the eyelid, for the absence of pain is not a criterion to be depended upon; it is always a sign of mischief when present, but its absence, or declared absence by the patient, is no proof that inflammation is not making rapid progress in the eye, whilst it never does take place without its being known from the swelling of the eyelid. If the inflammation does not exceed the due adhesive stage there should be no swelling of the lid, although in cases where it has been raised frequently, and retained against the brow with difficulty, there may be a little effusion from that cause; but this will be readily distinguished; and if there be a doubt, the depression of the lower lid, so as to allow the under part of the sclerotic coat to be seen, will decide the point. The examination of the eyelid morning and evening, for the first few days, is, therefore, one of the most important points of the treatment. Where union has not taken place by the first intention, the light compress and bandage should be retained for many days, in order to prevent a separation of the parts, and to facilitate the process of healing by granulation, and which a gentle pressure always assists. When I expect, from any circumstances which have occurred during the operation, or from inflammation having taken place in excess afterwards, that the cut edges of the cornea have not united, I do not raise the lid until the eighth or even the tenth day,

and then only to examine the eye in the most careful manner; for I have so often found that an earlier examination has led to an immediate attack of inflammation, that I have desisted from doing that which almost always appeared to be detrimental. When the eye is known to be inflamed by the state of the eyelid, it is very bad practice to open it, for the pain and other symptoms of inflammation are almost always immediately increased. Inflammation of the iris, and of the internal parts of the eye, must of course take place occasionally; but I am quite satisfied that when it occurs, and which often happens about the fourth day, it generally arises from the examination made of the eye; and from the displacement of the edges of the incision which it gives rise to, occasioning or admitting of a prolapse of the iris, which is either accompanied or soon followed by inflammation. This attack must be met in the usual manner, but the prolapsed part of the iris should not be meddled with until the inflammation has been subdued, when, if it has not diminished in size, or become covered by a layer of cornea, it may be touched with a fine point of the argentum nitratum, on the same principles as those which guide its application when the iris protrudes through an ulcer. But this is very rarely necessary when the division of the cornea is effected upwards. In those protracted cases, which require the application of the compress, however light it may be to be prolonged, a secondary swelling of the eyelid, attended by a white and irritating discharge, will sometimes take place. This arises from irritation, and will be

easily removed by mild astringent applications, and by exchanging the bandage for a green shade, which covers both eyes from the light, but readily admits the access of fresh air. It should be remembered that the eye is not accustomed to be bound up, or kept closed, and that the sooner the bandage can be dispensed with the better; but on this point the patient's own feelings, of advantage or disadvantage, will be the best guide. The room in which the patient is placed should be darkened at first, and when the bandages are removed, and a shade substituted, he may gradually admit a greater degree of light, as he finds it agreeable; but he should proceed by degrees, exercising the eye but little, and living sparingly. The loss of the lens must be supplied by proper spectacles, which should not be fitted to the eyes for several weeks after the cure has been accomplished, in order to give time for the eye to recover as much as possible from the operation. The power of adjustment will be however lost, and two pairs of spectacles will be required, one for near and one for distant objects. Young people often recover very good sight; and in one instance I have seen the lens reproduced. The young woman in whom this took place, Ann Whalley, aged 23, came under my care nine years ago, when 14 years old, having congenital cataracts of both eyes, on which I operated with success. Some circumstance induced her mother to go out of town suddenly, before the eyes were quite clear, and I did not see her again until the 11th of March last, when a small

portion of capsule appeared to impede vision at the lower part of the pupil of the right eye, the left being quite free. Supposing that the removal of this portion of capsule would improve her sight I proposed it to her, and on doing it, I found, to my great surprise, that the lens had been reproduced, and was quite transparent. It became, of course, opaque, and is now dissolving in the usual manner.

Remarks on certain Spots discoverable in the Human Eye, and on the manner of detecting their situation, in a Letter from Captain KATER, F. R. S., *to* Mr. GUTHRIE.

York Gate, Regent's Park,
15th April, 1834.

MY DEAR SIR,

THE following is the mode I mentioned to you of detecting spots which may exist in the crystalline lens, or in the vitreous humour of the eye. It was the result of some accidental trials in the year 1825, and I should then have published it, had not Dr. Wollaston informed me that he had discovered the same method several years before.

If the flame of a taper at the distance of about twenty feet from the eye be viewed through a concave lens of about a quarter or half an inch focus, a circular disk of light will be perceived, which, if the diameter of the lens be greater than that of the pupil of the eye, will appear fringed at the circumference. Now if any spots exist, either upon the cornea, the crystalline lens, or in the vitreous humour, the shadow of such spots will, if the light be not too strong, be projected upon the retina. But, in order to be assured that such spots exist in the eye, it is necessary to turn the glass about its axis, when, if the spots move they are imperfections of the glass, and not of the eye. If such spots remain perfectly stationary, it may be concluded that they are either imperfections in the cornea or the crystalline lens.—See *Fig.* 1.

On continuing to look steadily at the taper, a floating spot, more or less transparent, may sometimes be perceived to arise slowly from the bottom of the eye until it attains a certain place, where it becomes nearly stationary. On moving the eye, or rubbing it, such spot is again depressed

and again rises slowly, and takes its station as before. Such spots appear to me to exist in the vitreous humour.

On first looking through the concave lens, many spots will perhaps be seen more or less moveable. These arise from particles of mucus upon the cornea, and are dissipated by rubbing the eye, though sometimes the mucus is so thickened as not to be dislodged without some difficulty. The fringe at the circumference of the luminous disk is the shadow of the edge of the iris forming the pupil.

The same effects occur if a convex lens be used, the focus of which is so short that the rays cross before they fall upon the crystalline lens; and in this case also the spots are represented as they actually exist in the eye with respect to the pupil.—See *Fig. 2.*

But if a convex lens of about an inch and a half focus be employed, so as to form with the crystalline a compound lens, the focus of which will be somewhere in the interior of the eye, we have a means of discovering in what part of the eye the spot is situated; for if the appearances be reversed, *viz.* if the spot which was seen at the lower part of the luminous disk when the concave lens was employed, should now appear on the upper part of the disk, the spot must be either in the crystalline lens or somewhere between it, and the compound focus formed within the eye, and the approximate distance of which focus from the crystalline lens may be calculated.—See *Fig. 3.* But if the apparent situation of the spot be the same as when the concave lens is used, such spot must be in the vitreous humour, and at a greater distance from the crystalline lens than the distance of the compound focus of the crystalline and the convex lens employed.

The spots which I have described are not visible under ordinary circumstances to the person in whose eye they exist, and have little, if any effect on the distinctness of vision. If they are perfectly or nearly opaque, they may be compared to wafers put upon the surface of the object glass of a telescope, which have no other influence on the

image formed than that of rendering it less luminous, by impeding the transmission of a certain quantity of light. Such spots may, however, prove a most serious evil to the scientific observer, as their shadow is perceptible on looking through a telescope of high power.

If a spot is constantly seen by a patient under all ordinary circumstances, that spot, I conceive, must originate in some imperfection of the retina.

I am, my dear Sir,

Your's truly,

HENRY KATER.

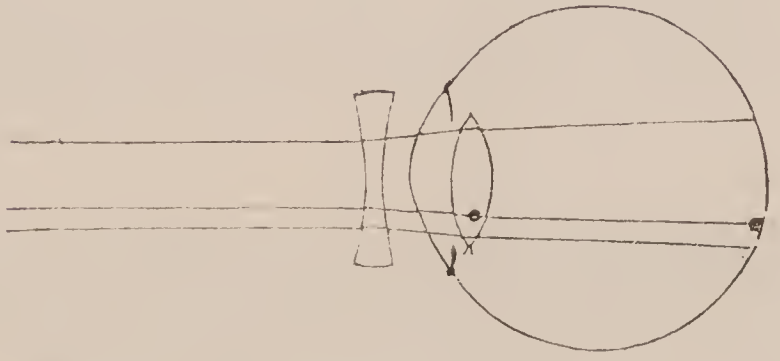


Fig. 1.

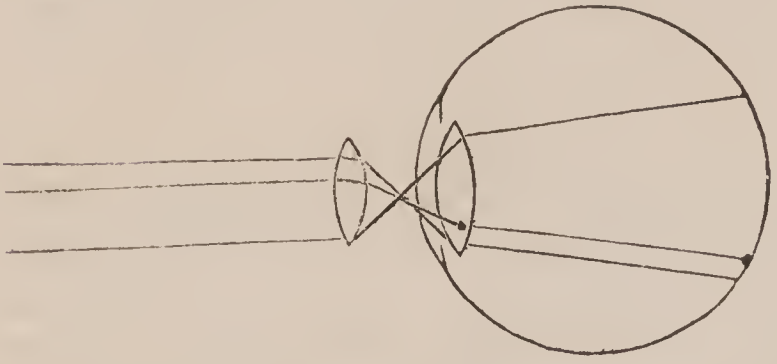


Fig. 2.

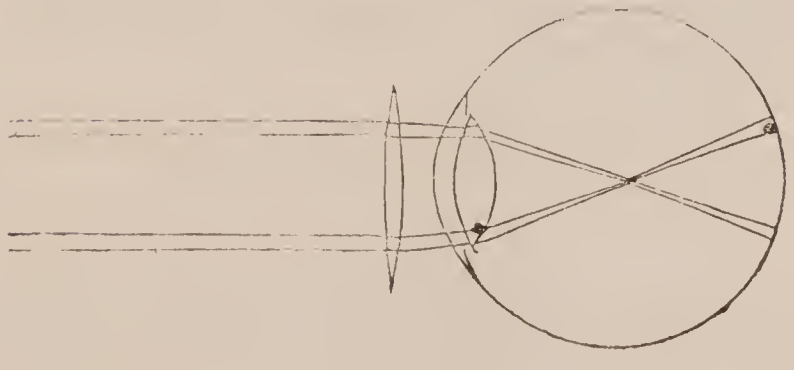


Fig. 3.

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